

We claim:

1           1. In a process for producing silicon carbide articles by  
2 chemical vapor deposition comprising:

3           providing a silicon carbide precursor gas in proximity to a  
4 surface of a solid substrate in a deposition chamber,

5           reacting said silicon carbide precursor gas to provide a  
6 silicon carbide deposit on a predetermined deposition zone on said  
7 surface of said substrate,

8           thereafter removing said substrate with said silicon carbide  
9 deposit from said deposition chamber, and

10          recovering said deposit by separating it from said substrate,  
11          the improvement comprising:

12          providing at least one boundary zone on a portion of said  
13 surface located between said predetermined deposition zone and a  
14 proximate solid surface in said deposition chamber, and

15          producing a silicon carbide deposit on the predetermined  
16 deposition zone which is substantially thicker than the deposit  
17 produced in said boundary zone.

1           2. The process of claim 1, wherein the thickness of said  
2 deposit produced in said boundary zone decreases as it extends away  
3 from said deposition zone.

1           3. The process of claim 1, wherein essentially no deposit is  
2 formed on the portion of said boundary zone which is closest to  
3 said proximate solid surface.

1           4. The process of claim 1, wherein an isolation device is  
2 arranged between said proximate solid surface and said substrate,  
3 and said isolation device includes a side wall which extends over  
4 said boundary zone.

2           5.    The process of claim 4 wherein said proximate solid  
3 surface is a surface of a second solid substrate.

1           6.    The process of claim 4, wherein said proximate solid  
2 surface supports said isolation device and said isolation device  
3 supports said substrate.

1           7.    A process of producing a silicon carbide article,  
2 comprising:

3           providing a silicon carbide precursor gas in proximity to a  
4 predetermined deposition zone on a surface of a solid substrate in  
5 a deposition chamber,

6           reacting said silicon carbide precursor gas to form a silicon  
7 carbide deposit on said predetermined deposition zone,

8           defining a boundary zone of diminished deposit thickness on  
9 said surface adjacent said predetermined deposition zone,

10          providing a channel overlying said boundary zone, said channel  
11 being defined by (a) said boundary zone, (b) an outer wall spaced  
12 from and extending over said boundary zone, (c) a closed end  
13 extending between said boundary zone and said outer wall, and (d)  
14 an open end opposite said closed end and adjacent said deposition  
15 zone, and

16          recovering said silicon carbide deposit from said substrate  
17 surface.

1           8.    The process of claim 7, wherein the width of said channel  
2 at its open end ( $w_1$ ) is one to two times the thickness of the  
3 recovered deposit.

1           9.    The process of claim 7, wherein the distance between the  
2 channel's open end and its closed end ( $h$ ) is 1,5 to 5 times the  
3 width of said channel at its open end ( $w_1$ ).

1           10. The process of claim 7, wherein the width of said channel  
2 at its open end ( $w_1$ ) is at least twice its width at its closed end  
3 ( $w_2$ ).

1           11. The process of claim 7, wherein said substrate is  
2 separated from another solid surface in said deposition chamber by  
3 an isolation device.

1           12. The process of claim 11, wherein said outer wall and said  
2 closed end are integral parts of said isolation device.

1           13. The process of claim 12, wherein said substrate is  
2 supported by said isolation device.

1           14. The process of claim 13, wherein said isolation device is  
2 supported by said another solid surface.

1           15. The process of claim 12, wherein said isolation device  
2 separates two substrates.

1           16. The process of claim 7, wherein said substrate extends  
2 around a hollow core.

1           17. The process of claim 16, wherein said substrate has a  
2 cylindrical or frustroconical shape.

1           18. The process of claim 16, wherein said substrate comprises  
2 a series of planar walls extending around said hollow core.

1           19. The process of claim 16, wherein said outer wall and said  
2 closed end are integral parts of an isolation device which  
3 separates the interior hollow core of said substrate from said  
4 precursor silicon carbide gas in said deposition chamber.

1        20. An apparatus for forming solid deposits from gaseous  
2 precursors, comprising:

3        a solid substrate,

4        a housing defining a deposition chamber, said housing being  
5 capable of opening and closing sufficiently to allow the insertion  
6 and removal of said solid substrate,

7        a source of a gaseous precursor material operatively connected  
8 to said deposition chamber,

9        an isolation device located between said solid substrate and  
10 a proximate solid surface in said deposition chamber, said  
11 isolation device cooperating with said substrate to restrict the  
12 flow of said gaseous precursor material over a boundary zone  
13 extending adjacent the border of said substrate closest to said  
14 proximate solid surface.

1        21. An apparatus according to claim 20, wherein:

2        said isolation device comprises an outer wall spaced from and  
3 extending over said boundary zone from an open end to a closed end,  
4 said closed end extending between said substrate and said outer  
5 wall.

1        22. An apparatus according to claim 21, wherein:

2        said outer wall is spaced a greater distance from said solid  
3 substrate at said open end ( $w_1$ ) than it is spaced from said solid  
4 substrate at said closed end ( $w_2$ ).

1        23. An apparatus according to claim 21, wherein:

2        said open end of said outer wall is spaced from said closed  
3 end a distance which is 2 to 5 times the distance,  $w_1$ , the outer  
4 wall portion is spaced from said substrate at said open end.

1 24. An apparatus according to claim 21, wherein:  
2 two solid substrates are arranged one atop the other in said  
3 deposition chamber, and said isolation device is located between  
4 the adjacent solid surfaces of the two substrates.

1 25. An apparatus according to claim 24, wherein:  
2 said substrates are generally cylindrical or frustroconical in  
3 shape.

1 26. An apparatus according to claim 20, wherein:  
2 said substrate is supported in said deposition chamber by said  
3 isolation device.

1 27. A hollow silicon carbide shell having a ratio of external  
2 perimeter to wall thickness greater than 50.

1 28. The hollow shell of claim 27 having a cylindrical shape.

1 29. The hollow shell of claim 27 having a frustroconical  
2 shape.

1 30. The hollow shell of claim 27, wherein the density of said  
2 silicon carbide is at least 3.15 grams per cubic centimeter.

1 31. The hollow shell of claim 27, wherein said external  
2 perimeter is in excess of 50 inches.

1 32. The hollow shell of claim 27, wherein said external  
2 perimeter is in excess of 65 inches.

1 33. The hollow shell of claim 27, wherein said ratio is 200  
2 or greater.